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Operating Instructions

Quadax Series Butterfly Valves

(with hand drive)

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Table of Contents

0 Introduction 3
1 Intended use 3
2 Safety instructions 3
2.1 General safety instructions 3
2.2 Safety instructions for the operator 3
2.3 Particular hazards 4
2.4 Labeling of the butterfly valve 5
3 Transport and storage 5
4 Installation in the pipeline 5
4.1 General 5
4.2 Working steps 6
5 Pressure test and commissioning 8
6 Normal operation and maintenance 8
7 Troubleshooting 8
8 Warnings 9
9 Further information 10

0 Introduction

These operating instructions are designed to offer the user of butterfly valves from the QUADAX series support in terms of installation, operation and maintenance.

Attention	**Non-adherence to the following caution and warning notices may lead to hazards,** which in turn may cause the warranty to become invalid. Please contact the manufacturer for any questions. For addresses please refer to section 9.

1 Intended use

Butterfly valves of the QUADAX series with hand drives are only to be used - following the installation of a pipeline system (between flanges or by welding) and following the connection to the controls - to close off or pass on media or to regulate flow within the permitted pressure and temperature limits. These butterfly valves are not recommended for media with solid particulates, they are especially not recommended for wear-causing solid media.

In the planning documentation of the CO-AX brochure <QUADAX butterfly valve> (cf. section 9 <Information>) describes the permissible pressure and temperature range.

When using the valve please ensure that section 2.2 < Safety instructions for the operator>.

Attention	If there is a pressure difference larger than 0.15 bar (liquid agents at ca. 20°C) for valve used for uninterrupted operation for controlling, please discuss the respective application limits with the manufacture. Cavitations must be avoided.

2 Safety instructions

2.1 General safety instructions

The same safety instructions apply to valves as to the piping system in which they are installed. These instructions only offer safety instructions that should be observed **additionally** for valves.

2.2 Safety instructions for the operator

It is not the responsibility of the manufacturer CO-AX and, it must be ensured prior to use of the valve that:

⇒ the valve is only used as intended, as described in section 1.

Danger - Life threatening	No valve may be operated, whose permissible pressure/temperature range (= "rating") is insufficient for operating conditions: This permitted range is described in the CO-AX brochure <QUADAX butterfly valves> - see section 8 <Information>. For materials, pressures or temperatures that have not been specified in the above brochure, permissible pressures above room temperature must be released by the manufacture. **Non-observance of these instructions can endanger life and limb and may cause damage to the pipe system.**
Caution	It must be ensured that the selected materials of the parts of the valve that come into contact with media must be suitable for the media used. The manufacturer assumes no liability for damages that have been caused by corrosion or aggressive media. **Non-observance of these instructions can endanger life and limb and may cause damage to the pipe system.**

- ⇒ A drive which was subsequently mounted on the valve, which was adjusted to the valve and in both end positions correctly adjusted. In the closed position, the end stop must be in the seat of the valve. A stroke limitation in the drive should either be reset or made ineffective.
- ⇒ The pipe system was installed professionally. The wall thickness of the valve body is dimensioned so that in such professionally routed pipelines an additional load F_z of the standard range ($F_z = \pi/4 \cdot DN^2 \cdot PS$) is considered. With butterfly valves for clamping even higher values for F_z can be permitted. Any shear forces applied to the valve may not exceed 10% of the aforementioned forces.
  (PS = maximum permissible rated pressure at room temperature),
- ⇒ The butterfly valve is professionally connected to the pipeline system, especially such valves which are connected to the pipeline by welding.
- ⇒ In this pipe system, the usual flow rates (e.g. 4 m/s for liquids) in continuous operation are not exceeded and abnormal operating conditions such as vibrations, water hammers, temperature shocks, cavitations, wet steam with a high water content and more than insignificant portions of solids in the medium - particularly abrasive ones - are cleared with the manufacturer.
- ⇒ valves which are operated at operating temperatures of >50°C or <-20°C are protected against contact together with the pipe connections,
- ⇒ the valves are only operated and maintained by specialized and trained personnel.

2.3 Particular hazards

Danger - Life threatening	The valve shaft is sealed by a stuffing box. Before the nuts on the stuffing box gland are loosened or unscrewed, **the pressure in the pipeline has to be completely reduced,** so that no medium escapes from the stuffing box.
Danger - Life threatening	Before loosening the plug (or the cover) on the body or before removing the valve from the pipeline **the pressure in the pipeline has to be completely reduced** so that no medium can escape from the line uncontrollably**.** It must be ensured **that the valve is opened 5°-10°,** so that any pressure can escape from both sides of the valve. The gear box may – if required – be disassembled only once the valve has been opened for this purpose and that **it remains in this opened position**.
Caution	*For valves used at end of line:* With normal operation, especially with gaseous, hot and/or hazardous media **a blind flange or a sealing cover has to be mounted on the free connecting socket** or (only for short-term use!) the valve has to be securely locked in “CLOSED” position. Caution when closing such as valve: Danger of crushing!
Caution	If a valve has to be opened in a pressurized line as a terminal valve, this must be performed with utmost caution so that **spurting medium** does not cause any damage. Caution when closing such as valve: Danger of crushing!
Caution	*If a valve has to be removed from a pipeline:* Medium may escape from the line or the valve. In the case of media which are harmful to health or hazardous the pipeline has to be completely empty before the valve is removed. Please be careful with **residues which continue to flow from dead spaces of the valve or line** or **which remain in the valve (under pressure).**

2.4 Labeling of the butterfly valve

Each butterfly valve is labeled with the following data (type plate):

	Marking	Comment
Manufacturer	**www.co-ax.com**	Address see section 9 <Information>
Type code	e.g.:**EQK102004XXXXXXXXX XXX XXC XXXXX**	Code no.: valve identification
Serial number	e.g.: **251896.1-AA**	Corresponds to: Order no. and production no.
KNA-Nr.	e.g.: **800005**	Kundenneutrale Artikelnummer
Type / PN	**QUADAX DNXXX (X“)**	Numerical value in mm, e.g. DN200 or in inches, e.g. 8"
PN / class	**Numerical value** for PN / class	PN / class = Dimension standard for flanged butterfly valve
CWP / PS	**Numerical value** in bar or PSI	= Pressure, upper limit of usage at 20°C
max. T / TS	**Numerical value** in °C or °F	= Temperature, upper limit of usage
Year of manufacture	e.g.: **43/09**	= Delivery week/year of manufacture
	CE **0036**	number of the specified body in accordance with RL 97/23/EG
	CE Ex **II 2 GD c T6**	Ex-marking „none electrical part“
directional arrow	←	Marking of the preferred flow direction

The materials used in the valve, as well as parts that come into contact with the media, as well as pressure parts are uniquely coded in the type code. The manufacturing date can be uniquely traced via the serial number. In order to be able to identify the valve, the type plate may not be removed nor damaged.

3 Transport and storage

Valves have to be handled, transported and stored with care:

- ⇒ The valve is to be kept in its original packaging and/or with the protection caps on the flange connections/ weld ends. The valve should be stored and transported (also to the installation site) on a pallet (or supported in a similar way).
- ⇒ If stored prior to installation, the valve is to be stored in a closed room and to be protected against harmful influences such as dirt or moisture.
- ⇒ Especially the metallic seat in the valve and the flange connection faces/weld ends must not be damaged by mechanical or any other influences.
- ⇒ Valves must be stored in the same way they were delivered. The drive may not be activated.

⚠ **Caution**	*Valves delivered without a drive:* The valve must be transported carefully: The unsecured valve disc may open from closing position due to external effects (e.g. shaking).

4 Installation in the pipeline

4.1 General

The same instructions apply to the installation of valves in a pipeline as for the connection of pipes and similar piping elements. The following instructions **additionally** apply to valves. For the transport to the installation site please also observe section 3 (above).

Attention	Butterfly valves – especially those with short face-to-face dimensions – must be **transported and installed with a closed valve disc**. Otherwise the disc could be damaged and the valve would leak.
Attention	If the valve is intended to be used as an end flap, either the closing lid has to be mounted at the outlet or the drive must be securely shielded against unauthorized operation, in order to prevent any risk of crushing.
Note	*The butterfly valve must be adjusted by the manufacturer for a sealed closed position:* In the closed position, the end stop of the manual gear box must be made ineffective and the disc must be able to reach the seat of the butterfly valve. **The "CLOSED" position of the end stop** may not be changed.
Danger - Life threatening	*If – in an exceptional case – a valve has to be mounted without the drive:* It must be ensured that such a **valve is not pressurized**. If a drive is retrofitted, torque, direction of rotation, and the setting of the end stops "OPEN" and "CLOSED" of the valve have to be adjusted to the operating conditions. **Non-observance of these instructions can endanger life and limb and may cause damage to the pipe system.**

4.2 Working steps

⇒ Transport valve in the protective packaging to the installation site and unpack it only there.

⇒ Inspect valve and drive for any damages that may have occurred during transport. Damaged valves or drives may not be installed.

⇒ At the beginning of installation, a function inspection must be performed: The valve must open and close properly. Discernible malfunctions must be remedied prior to commissioning. See also section 7, <Troubleshooting>. The position indicator on the drive must correspond to the setting of the valve disc.

⇒ Ensure that only valves are installed with the pressure class, the connection type and connection dimensions which meet the application requirements. Observe the type plate on the valve.

Danger - Life threatening	No valve may be installed, whose permissible pressure/temperature range (= "rating") is insufficient for operating conditions: This permitted range is described in the CO-AX brochure <QUADAX butterfly valves> - see section 9 <Information>. For materials, pressures or temperatures that have not been specified in the above brochure, permissible pressures above room temperature must be released by the manufacture. **Non-observance of these instructions can endanger life and limb and may cause damage to the pipe system.** If in doubt, please contact the manufacturer.

⇒ *Butterfly valve with short face-to-face dimension*:
Counterflanges and/or pipe ends have to have a clear span allowing for sufficient space for the opened valve disc, so that the latter is not damaged when being swivelled out.

⇒ Prior to installation the valve and the downstream pipeline have to be thoroughly cleaned of any contamination, especially of hard foreign substances.

⇒ *Butterfly valves of the series QUADAX can generally be installed irrespective of the flow direction. To benefit from the optimum function of the butterfly valves:*
it is recommended to install the valve so that **an arrow direction marked** on the housing corresponds to the direction **that the pressure exerts on the closed disc.** This direction may well be opposite to the flow direction with opened butterfly valve!

⇒ The preferred installation position is the one with horizontal valve shaft. If possible, the drive should not be mounted directly below the valve. Stuffing box leakage could damage the drive.

Caution	A subsequently mounted drive must be supported if, as a result of its weight and/or the mounting position on the mounting kit, a non-scheduled bending load occurs between the valve and the drive.

⇒ When inserting the valve (and the flange seals) in an already mounted pipeline the distance between the pipeline ends has to be dimensioned in such a way that all connecting surfaces (and seals) remain undamaged.
The gap, however, must not be larger than necessary so that no additional stress is generated in the pipeline during installation.

Only butterfly valve with flanges:

⇒ The counter flanges of the pipeline have to be flush, level and parallel.

Attention	*Butterfly valves with flange ends:* The sealing surfaces on bodies with flange ends of the butterfly valve are designed in such a way that flange seals according to EN1514-1 or ANSI B16.21 are to be implemented. Counterflanges must have smooth sealing strips, e.g. shape C, D or E in line with EN 1092 or stock finish as per EN 1759. Other flange shapes are to be agreed with the manufacturer CO-AX.
Attention	Butterfly valves with a short face-to-face dimension must be inserted in the gap between the pipeline ends with a closed valve disc. Otherwise the disc could be damaged and the valve would leak.

⇒ Flanged butterfly valves are to be centered on the counterflange during installation by means of the flange screws before the screws are tightened.

Attention	Butterfly valves with a short face-to-face dimension partly require screws of a varying length for the connection to the counterflanges. For the measurements for the flange screws please refer to CO-AX planning documentation

Only butterfly valve with weld ends:

⇒ The weld ends of the valve have to be flush, level and parallel and of the same material as the pipes - see type plate of the valve. Opposite weld ends have to fit to one another in terms of diameter and shape.

⇒ Welding cables must not be connected to the valve but to the pipeline.

⇒ By professional welding it has to be ensured that neither considerable tensions are generated in the pipe section or transferred to the valve nor that the butterfly valve is damaged by heat effect. Only temperatures of <300°C measured on the body wall are permissible.

⇒ *Butterfly valves >DN 400:*

Attention	When welding the valve into the pipeline, the welding process has to be controlled so that the supplied heat is limited and a distortion of the valve body is avoided. For example, the weld end should be "crossed" in order to prevent tension to the valve housing. Non-compliance with these constructions may lead to a distortion of the valve housing. A lasting distortion of 1/10 mm in the seat area (around the bearing sockets) can render the valve useless.

5 Pressure test and commissioning

The pressure test of the valves has already been performed by the manufacturer. For the pressure test of the pipe section with installed valves, the following should be taken into consideration:

⇒ First thoroughly flush newly installed line systems in order to flood out all foreign substances.

⇒ **Valve opened:** The testing pressure may not exceed the **value 1.5 x PS** (according to type plate).*(PS = maximum permissible rated pressure at 20°C).*

⇒ **Valve closed:** The testing pressure may not exceed the **value 1.1 x PS** (according to type plate).

If any leakage occurs from a valve, please refer to section 7 <Troubleshooting>.

6 Normal operation and maintenance

Valves which were delivered ex works with the drive are adjusted for correct operation and should not be re-adjusted as long as the valve is in perfect working order.

To operate the hand wheel on the drive, regular hand force is sufficient; the use of extensions to increase the actuation torque is not permitted.

Regular maintenance work on the valves is not required; however, when the line section is inspected no leakage may escape to the outside on any valve. In such cases, please refer to section 7 < Troubleshooting>.

It is recommended to actuate valves remaining in one position once or twice a year.

Furthermore, the nuts on the gland should be retightened every 6 months or after 1000 switching cycles, whichever occurs first.

The prospective switching cycles of the valve are being calculated with the following formula: (4,000,000 / DN(mm)). If the actual amount of switching cycles exceeds the calculated number, please review with the manufacturer.

⚠ **Caution**	*A butterfly valve is normally not self-locking:* The drive may not be removed **as long as the butterfly valve is pressurized.**

7 Troubleshooting

When remedying faults section 2 <Security notes> must be observed.

Type of malfunction	Measure	Note
Leakage on the flange connection or plug or housing cover	Retighten flange screws. *If the leakage cannot be remedied in this manner:* repair required: replace seal. Observe section 2.3. <Particular hazards> and request spare parts and necessary manual from CO-AX.	***Note 1:*** *Spare parts must be ordered incl. all specifications made on the type plate. Only original CO-AX spare parts can be installed.*
Leakage in the seat seal	Check whether the valve is 100% sealed. *If the valve is closed:* Check whether the drive closes with full torque. *If this is the case:*	

	Open/close valve repeatedly under pressure. *If the valve continues to leak:* repair required: Replace seat seal. Observe section 2.3. <Particular hazards> and request spare parts and necessary manual from CO-AX.	***Note 2:*** *If after the removal it is discovered that the body and/ or the inner parts are not sufficiently resistant to the medium, parts made of a suitable material are to be selected.*
Leakage on the stuffing box	Retighten both nuts on the stuffing box gland alternately and in small steps of quarter turns each clockwise. *If the leakage cannot be remedied in this manner:* repair required: Request spare parts and necessary instructions from CO-AX. *If the nuts on the stuffing box gland have to be loosened or unscrewed (counter-clockwise):* **Danger! Life threatening!** In order to protect the operating personnel against any danger please ensure that the line has been depressurized on both sides of the valve. Please observe section 2.3 <Particular hazards>.	
Malfunction	Check function of drive. *If drive and control are ok:* Remove and inspect valve (in observance of the notes from section 2.3, <Particular hazards>). *If the valve is damaged:* Repair required: Request spare parts and necessary instructions from CO-AX.	

8 Warnings

Source of danger	Measure
Generation of a flammable atmosphere	Operating instructions: Please watch out for leakages, as a flammable atmosphere may otherwise develop
Sparks during commissioning / assembly	Operating instructions: Assembly / disassembly / service only allowed for a non-flammable atmosphere
Loading single components	Please make sure that the QUADAX valve is earthed. Any existing attachment parts should be dealt with in line with manufacturer instructions.
Application	Any heat build-up of valve parts as a result of hot media must be below ignition temperature Sound energy can be caused by attachment parts or flow noise Closing times below the rule of thumb are not allowed (Closing time in s = nominal width in mm / 100) not allowed The specific manufacturer operating instructions must be referred to for any existing attachment parts
Generation of ignition sources	When installing additional parts which have not been installed by the manufacturer or have been explicitly approved for installation, such as aluminium plates or other fittings, e.g. electric position feedback, a NEW

	hazard analysis has to be performed.
Corrosion	Corrosion exceeding 1.5mm may lead to a weakening of pressure parts and impair the functionality of the valve or may even lead to breakdown.

9 Further information

These operating instructions, the so-called CO-AX brochures and further information – also in other languages – can be obtained here:

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